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DEPARTMENTS.

SOLUTIONS OF PROBLEMS.

ALGEBRA.

354. **Proposed by THEODORE L. DeLAND, Treasury Department, Washington, D. C.**

To find x in the following equation:

$$0.002\{6x-20[(1.05)^x-1]\}=0.012\{21[(1.05)^{x-1}-1]-(x-1)\}.$$

Solution by J. SCHEFFER, A. M., Kee Mar College, Hagerstown, Md

The equation readily reduces to

$$3x-35[(1.05)^x-1]=0,$$

from which it is easily seen that $x=0$ is one root of the equation. Another root, we find by a process of approximation, to be $x=21.29$ (nearly).

Also solved by V. M. Spunar, S. G. Barton, and the Proposer.

The equation, being transcendental, has an infinite number of roots, real and imaginary. By compounding the graph of the trandscendental part of the equation with the graph of the linear part, it appears that the above are the only two real roots. ED. F.

355. **Proposed by V. M. SPUNAR, M. and E. E., Chicago, Ill.**

Solve the equations:

$$\begin{aligned}
&\frac{1}{x_1}+\frac{1}{x_2}+\frac{1}{x_3}=a_1;\\
&\frac{1}{x_2}+\frac{1}{x_3}+\frac{1}{x_4}=a_2;\\
&\frac{1}{x_3}+\frac{1}{x_4}+\frac{1}{x_5}=a_3;\\
&\quad\cdot\quad\cdot\quad\cdot\quad\cdot\quad\cdot\quad\cdot\quad\cdot\\
&\frac{1}{x_{n-2}}+\frac{1}{x_{n-1}}+\frac{1}{x_n}=a_{n-2};\\
&\frac{1}{x_{n-1}}+\frac{1}{x_n}+\frac{1}{x_1}=a_{n-1};\\
&\frac{1}{x_n}+\frac{1}{x_1}+\frac{1}{x_2}=a_n.
\end{aligned}$$

Solution by B. F. FINKEL, Ph. D., Drury College, Springfield, Mo.

Considering the system of equations as linear in the unknowns $\frac{1}{x_1}$, $\frac{1}{x_2}$, ..., $\frac{1}{x_n}$, the values of the unknowns may be readily found by determinants.